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NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
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Date of mailing (day/month/year) 19 March 2002 (19.03.02)	From the INTERNATIONAL BUREAU To: STRAUS, Alexander Becker Kurig Straus Bavariastrasse 7 80336 München ALLEMAGNE
Applicant's or agent's file reference NO 6408/WO	IMPORTANT NOTIFICATION
International application No. PCT/EP00/01737	International filing date (day/month/year) 28 February 2000 (28.02.00)

1. The following indications appeared on record concerning:

the applicant the inventor the agent the common representative

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2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

the person the name the address the nationality the residence

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3. Further observations, if necessary:

4. A copy of this notification has been sent to:

the receiving Office the designated Offices concerned
 the International Searching Authority the elected Offices concerned
 the International Preliminary Examining Authority other: LOCK, Graham

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer N. Wagner Telephone No.: (41-22) 338.83.38
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PATENT COOPERATION TREATY

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NOTIFICATION OF ELECTION
(PCT Rule 61.2)

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To:

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International filing date (day/month/year) 28 February 2000 (28.02.00)	Priority date (day/month/year) 01 March 1999 (01.03.99)
Applicant SHER, Alexander et al	

1. The designated Office is hereby notified of its election made:

 in the demand filed with the International Preliminary Examining Authority on:

19 September 2000 (19.09.00)

 in a notice effecting later election filed with the International Bureau on:

2. The election was was not

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(54) Title: FERRIC FORTIFICATION FOR FOODS AND DRINKS

(57) Abstract

An iron fortification complex which may be used to fortify foods and beverages with iron. The complex is formed of ferric ions and caseinate. The complex is sufficiently stable as to be suitable for use in retorted products. However, despite the stability, the iron in the complexes has substantially the same bioavailability as ferrous sulfate.

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FERRIC FORTIFICATION FOR FOODS AND DRINKS

Field of the Invention

5 This invention relates to a fortification system which may be used to fortify foodstuffs and beverages. The invention also relates to a method of fortifying foodstuffs and beverages.

Background of the Invention

10 Iron is an essential trace element in animal and human nutrition. It is a component of heme in hemoglobin and of myoglobin, cytochromes and several enzymes. The main role of iron is its participation in the transport, storage and utilization of oxygen. Inadequate iron is a direct cause of the high incidence of 15 anemia, especially among children, adolescents and women. The need for adequate iron is one which extends for the entire life of the human being.

20 However the body does not produce iron and is totally dependent on an external supply of iron; nutritional or supplementary. The recommended daily allowance for iron intake is usually about 10 mg per day. However the amount needed is dependent on age and sex. Children, women up to the time of menopause, and expectant and nursing mothers have higher requirements of iron.

25 Therefore iron deficiency is essentially a nutritional problem; a nutritional problem which is common not only in the developing countries. The problem is readily dealt with by consuming foods which naturally provide adequate iron but this is not always possible in disadvantaged societies. Also, many foods normally consumed in developed countries are poor in iron.

30 To provide a source of iron, many foods and beverages are supplemented with iron. Usually the iron source used in supplementation is a soluble iron salt such as ferrous sulfate, ferrous lactate, ferrous gluconate, ferrous fumarate, ferric citrate, ferric choline citrate, and ferric ammonium citrate. Ferrous sulfate is especially common due to its good bioavailability. Unfortunately, iron supplementation and especially ferrous sulfate supplementation has deleterious effects. In particular, the iron often causes discoloration and off-flavors due to its capacity to interact with polyphenols and lipids and to promote destructive free-35 radical reactions. This is especially the case at high temperatures and in the presence of oxygen and light.

For example, the addition of a soluble iron source to chocolate milk powder causes the beverage to turn to dark gray when reconstituted with water or milk. It is believed that this is due to the interaction between the iron and iron sensitive ingredients, such as polyphenols. Further, the addition of soluble iron sources to milk, cereals, other fat containing products, mostly products with high level of unsaturated fatty acids, causes flavor changes due to lipid oxidation. Lipid oxidation not only affects the organoleptic properties of foods and beverages, but also undesirably affects the nutritional quality of these products. These interactions can be also enhanced during heat treatment, such as pasteurization or sterilization. In addition, the pH of some iron salts systems may not be compatible with other ingredients or may affect the flavor. Also, from a technical point of view, soluble iron salts can cause corrosion of processing equipment.

Unfortunately, non-soluble or slightly soluble iron sources such as elemental iron, ferric pyrophosphate, etc., are not sufficiently bioavailable. Therefore, while they may cause little or no discoloration and off-flavor problems, they are poorly absorbed by the body.

To deal with these problems, there have been several attempts to encapsulate or complex soluble iron sources in a way which reduces their reactivity but which maintains their bioavailability. However the attempts have not been entirely successful.

An example of encapsulated iron source is described in US patent 3,992,555 where iron is coated in an edible, metabolizable fat which has a melting point between about 38°C and about 121°C. Hydrogenated and refined vegetable oils, and particularly distilled monoglycerides from fully hydrogenated cottonseed oil, are described to be suitable. Although this encapsulation of the iron results in about a 20% reduction in bioavailability, this is stated to be acceptable providing the iron source used has a sufficiently good bioavailability. However, the primary problem is that, if the foods must undergo any form of harsh processing, the capsule is destroyed. Consequently the encapsulated iron cannot be used in products which need to be retorted or subjected to other forms of harsh treatment.

An early example of an iron complex is described in US patent No 505,986. This complex is an iron albumin preparation. The albumin is in intact but heat coagulated form. The complex is recovered as a precipitate. However, when these iron albumin complexes are used in beverages, discoloration and oxidation

does occur. For example, chocolate beverages fortified with iron albumin complexes turn a gray color.

More recent examples of iron complexes are described in US patent 3,969,540 where iron in the ferric form is complexed with hydrolyzed casein or 5 hydrolyzed liver powder. Various other hydrolyzed proteins are also mentioned as possible ligands. The complexes are collected as insoluble precipitates. Unfortunately the iron in the complexes is unlikely to have acceptable bioavailability.

Further examples iron complexes are described in US patent 4,172,072 10 where iron is complexed with substantially completely hydrolyzed collagen. Various other completely hydrolyzed proteins are also mentioned as possible ligands. However, the complexes are stated to be stable under acidic conditions and, since the conditions in the gut are acidic, the iron in the complexes is unlikely to have acceptable bioavailability. Also, the complexes are not 15 sufficiently strong to prevent discoloration and lipid oxidation.

Further examples are described in US patent 4,216,144 where iron in the ferrous form is complexed with hydrolyzed protein; especially soy protein. The bioavailability of the iron in the complexes is claimed to be better than ferrous sulfate. However, when ferrous-soy hydrolysate complexes are used in 20 beverages, discoloration and oxidation does occur. For example, chocolate beverages fortified with ferrous-soy hydrolysate complexes turn a gray color.

Other examples of iron complexes are described in Japanese patent 25 applications 2-083333 and 2-083400. In these applications, ferrous caseinate complexes are used to treat anemia. However, these complexes are not suitable for use in fortifying foods and beverages because they are not sufficiently stable. Also, these complexes are in the form of coagulates and are difficult to disperse.

It is therefore an object of the invention to provide an iron fortification system which is relatively stable but in which the iron is relatively bioavailable.

30 Summary of the Invention

Accordingly, in one aspect, this invention provides an iron fortification system suitable for foods and beverages, the fortification system comprising a ferric-caseinate complex.

35 It has been surprisingly found that ferric-caseinate complexes provide excellent iron fortification systems. The system is stable but the iron is

surprisingly bioavailable. Further, the system is made of food grade ingredients and is suitable for use in all foods and beverages.

5 In a further aspect, this invention provides a foods or beverage which is fortified with iron, the foodstuff or beverage containing an fortification system comprising a ferric-caseinate complex.

The foodstuff or beverage may contain fat. Further, the foods or beverage may contain polyphenols.

In a yet further aspect, this invention provides a process for the preparation of a ferric-caseinate complex, the process comprising:

10 dissolving a casein source in an aqueous liquid to provide a casein solution;
adjusting the pH of the casein solution to about 5.4 to about 6.2;
dissolving a ferric salt in an aqueous liquid to provide a ferric solution;
adjusting the pH of the ferric solution to about 5.4 to about 6.2;
15 combining the ferric solution with the casein solution and adjusting the pH to about 5.4 to about 7.0; and
collecting ferric-caseinate complexes which form.

Preferably, the pH of the combined ferric solution and casein solution is adjusted to about 5.8 to about 6.2.

20 Detailed Description of the Preferred Embodiments

Embodiments of the invention are now described by way of example only. This invention provides an iron fortification system suitable for foods and beverages. The fortification system is a ferric-caseinate complex which is stable but in which the iron remains bioavailable. The resulting iron complexes have reduced ability to cause deleterious effects such as lipid oxidation, color degradation, and vitamin C degradation. This makes the iron complexes an ideal vehicle for fortifying foods and beverages; especially foods and beverages intended to improve nutritional status.

30 The casein used in the complex may be obtained from any suitable source of substantially intact casein. Examples include sodium caseinate, rennet casein, acid casein, non fat milk solids, and the like. Sodium caseinate obtained from MD Foods Ingredients, Inc under the name MIPRODAN are particularly suitable. The sodium caseinate may be in aqueous or dried form.

35 The ferric ion may be provided in any suitable, food grade form. Suitable examples include ferric sulfate, ferric chloride, ferric nitrate, ferric citrate, ferric

lactate, and ferric fumarate, of mixtures of these ferric salts. Ferric sulfate is particularly preferred.

5 The complex is produced by combining the ferric ion source and the caseinate source in solution. This must be carried out at a pH selected to avoid precipitation of the caseinate but at which free ferric ions are available. Suitably, the ferric ion source and the caseinate source are combined at a pH in the range of about 5.4 to about 7.0; for example about 5.8 to about 6.2.

10 The process may be carried out by dissolving a the caseinate source in an aqueous liquid such as water; usually under agitation. Mixing is suitably continued until the solution is substantially homogeneous. The pH of the resulting casein solution is adjusted to an acidic pH avoid the formation of ferric hydroxide once the ferric source is added. Preferably, the pH is adjusted to about 5.8 to about 6.0.

15 The ferric source is also dissolved in an aqueous liquid such as water; usually under agitation. The pH of the ferric solution is maintained at about 5.4 to about 6.2; for example about 5.4 to about 5.6. This may be done by the addition of a suitable base. Any suitable food grade base may be used. Examples of suitable bases include sodium hydroxide, potassium hydroxide, ammonium hydroxide, magnesium hydroxide, sodium carbonate, sodium 20 bicarbonate, potassium carbonate, and potassium bicarbonate. Potassium hydroxide is preferred. The base may be at any suitable strength.

Maintaining the pH of the ferric solution above about 5.4 avoids the pH of the ferric-caseinate mixture dropping to the isoelectric point of casein. In this way, precipitation of the casein may be avoided or at least significantly reduced.

25 The ferric solution and the caseinate solution are then combined. This is preferably carried out under agitation with the ferric solution added to the caseinate solution; preferably slowly. The amount of the ferric solution which is added may be selected to provide the desired ferric loading. However, it is found that the optimum loading is about 1% by dried weight of iron. Of course, ferric loads of more or less than 1% may be used.

30 If necessary, the pH of the mixture is then adjusted to maintain it within the range of about 5.4 to about 7.0; preferably about 5.8 to about 6.2 while the ferric-caseinate complexes form. This may be done by adding a suitable food grade acid to the mixture. Examples of suitable acids include phosphoric acid, hydrochloric acid, sulfuric acid, lactic acid, malic acid, fumaric acid, gluconic 35

acid, succinic acid, ascorbic acid, or citric acid. Hydrochloric acid is preferred. The acid may be at any suitable strength.

5 The ferric-caseinate complexes are then permitted to form under stirring. The time necessary may be anything from about 10 minutes to about 24 hours. Typically the complexes form within about 10 minutes to about 3 hours. If necessary, further acid may be added with time to maintain the pH within the range of about 5.4 to about 7.0; preferably about 5.8 to about 6.2.

10 The complexes obtained may be used in liquid form as obtained. If desired, the pH may be adjusted to a neutral pH of about 6.0 to about 7.0 by adding a suitable base. Suitable bases are described above.

15 More preferably, the complexes are dried to powder. If desired, prior to drying the pH may be adjusted to a pH of about 6.0 to about 8.0 by adding a suitable base. Suitable bases are described above. The drying may be freeze-drying or may be spray drying. Any suitable procedure for spray- or freeze-drying the complexes to powder may be used. Suitable procedures are known in the art.

The complexes obtained are insoluble in water but are easily dispersed in water, milk and other liquids.

20 In use, the complexes are included in the ingredients making up the desired foods or beverage and the ingredients processed in the normal way. Although the bioavailability of the iron may be slightly less than that of ferrous sulfate, it is found that it is well within acceptable limits. In most cases, the statistical difference in bioavailability is not significant. Further, it is found that the complexes are very stable and when used in foods and beverages, do not lead to increased discoloration or off-flavor generation. Moreover, it is found that the complexes do not increase processing problems such as fouling.

25 The complexes are particularly suitable for use in foods or beverages in liquid form; for example infant formula concentrates and ready-to-drink beverages such as chocolate and malted milk drinks. These foods or beverages usually undergo retorting or other sterilization as part of their processing and hence the ability of the complexes to withstand harsh treatment provides a great improvement. However, the complexes may be used in other types of foods or beverages such as powdered beverages, infant formulas, and infant cereals.

30 The complexes may also be included in pet foods which usually contain lipids and vitamins.

Products which contain the complexes are perceived to have similar organoleptic properties and color as compared to unfortified products. This offers the advantage that products may be fortified without causing noticeable changes which may adversely affect consumer perception. Also, it is found that 5 vitamin C is not degraded by the complexes. Hence the complexes may be used in products which are intended to be nutritionally balanced.

Specific examples of the invention are now described to further illustrate the invention.

10 Example 1

An amount of 125 g of sodium caseinate (MIPRODAN-30, MD Foods Ingredients, Inc) is dissolved in 2500 g of water under agitation. Mixing is continued until the solution is substantially homogeneous. The pH is adjusted to 15 5.8 to 6.0 using 5% and 0.1 M HCl solutions.

An amount of 5.483 g of ferric sulfate pentahydrate is dissolved in 500 ml of water at room temperature. The solution is agitated and the pH is carefully adjusted to 5.5 using a 10% NaOH solution followed by a 0.1 M NaOH solution.

20 The ferric solution is slowly added to the caseinate solution under vigorous agitation. The suspension is stirred until it is homogeneous; about 1.0 to 1.5 hours. The pH is then adjusted to 6.0 using a 10% NaOH solution followed by a 0.1 M NaOH solution.

The suspension may be used as a liquid fortification system.

25 Example 2

The suspension of example 1 is subjected to freeze drying in a vacuum evaporator. The suspension is frozen to a temperature of -40°C.

30 The powder may be rapidly suspended in solution.

Example 3

35 The suspension of example 1 is subjected to spray drying in a spinning disk spray drier. The inlet temperature of the drying gas is 145°C while the outlet temperature is 80°C.

The powder may be rapidly suspended in solution.

Example 4

5 A chocolate powder (QUIK, obtained from Nestlé USA, Inc) is dissolved in milk. The chocolate powder constitutes 8.5% by weight of the drink. The chocolate drink is separated into two samples a powder of example 2 or 3 is added to the drinks to provide 12.5 ppm of iron.

10 The milk is placed in glass jars of 125 ml and heated to 75°C for 15 seconds. The jars are closed and cooled to room temperature.

15 The jars are inspected after 1 day, 2 weeks and 4 weeks storage and the drinks evaluated for color and taste. No change in color or flavor is detected as compared to a control which does not contain iron. Also, no coagulation is detected. The results indicate that the complexes are very stable.

Example 5

15

The process of example 4 is repeated except that the milk is autoclaved at 121°C for 3 minutes.

20 The jars are inspected after 6 months storage and the drinks evaluated for color and taste. No change in color or flavor is detected. Also, no coagulation is detected. The results indicate that the complexes are very stable.

Example 6

25 The powder of example 3 is added to (i) 22.0 g of chocolate powder (QUIK) and (ii) to 22.0 g of malted beverage powder (MILLO - Nestlé Australia Ltd). The powder mixtures are dissolved in 180 ml of boiling water. The beverages are stirred briefly and allowed to stand for 15 minutes. In both cases, the iron fortification is 15 ppm.

30 The beverages are then judged by a taste panel of five people for color and flavor. In each case, a control beverage produced without the powder of example 3 is used as comparison.

No change in color or flavor is detected.

Example 7

5 The powder of example 3 is added to a chocolate infant cereal to provide 7.5 mg of iron to 100 g of cereal. An amount of 55 g of the cereal is then reconstituted by adding 180 ml of boiling water. The cereal is briefly stirred and allowed to stand for 15 minutes at room temperature.

10 The cereal is then judged by a taste panel of five people for color and flavor. A control beverage produced without the powder of example 3 is used as comparison.

15 No change in color or flavor is detected.

Example 8

15 The powder of example 3 is added to chicken fat to provide 40 mg of iron per 1000g of fat. As a negative control, ferric sulfate is added to chicken fat to provide the same iron loading. Chicken fat without any added iron is used as a positive control.

20 The fat samples are heated to 100°C and the lipid oxidation induction time is determined using a Rancimat. No difference in induction time between the fat fortified with the powder of example 3 and the positive control is determined. The induction time of the negative control is 30 to 40% less.

25 The results indicate that the powder of example 3 does not induce lipid oxidation and is therefore suitable for use in products which contain fats.

25 Example 9

The procedure of example 8 is repeated except that fish oil is used in place of chicken fat. The results are similar.

30 Example 10

The bioavailability of the complexes are determined as follows:-

35 Animals:- The animals used are weanling male Sprague-Dawley rats aged 3 weeks (IFFA-CREDO, L'Arbresle, France).

Diets:- The control diet is an ICN Low-Iron diet (Soccochim SA, Lausanne, Switzerland) which has an iron content of 3 mg/kg. This diet is casein based and provides for the nutritional requirements of growing rats except for iron.

5

The experimental diets are:-

Diet A:- The control diet supplemented with $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ to provide 10 mg/kg iron.

10

Diet B:- The control diet supplemented with $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ to provide 20 mg/kg iron.

Diet 1:- The control diet supplemented with the complex of example 2 to provide 10 mg/kg iron.

Diet 2:- The control diet supplemented with the complex of example 2 to provide 20 mg/kg iron.

15

Analytical methods

20

1) Hemoglobin analysis is performed by anaesthetizing the rats with isoflurane and then drawing a sample of 200 μL of blood from the orbital venous plexus. Blood hemoglobin level in the sample is determined by the cyanmethemoglobin method (Hb kit MPR 3, Boehringer Mannheim GmbH, Germany), using an automated instrument (Hemocue, Baumann-Medical SA, Wetzikon, Switzerland). Commercial quality control blood samples (Dia-HT Kontrollblut, Dia MED, Cressier, Switzerland) having a range of hemoglobin levels are measured with all hemoglobin determinations.

25

2) Fe-bioavailability as compared to ferrous sulfate heptahydrate is evaluated using a slope-ratio calculation based upon hemoglobin levels. A multiple regression equation relates amounts of iron added to the hemoglobin levels. The equation provides one straight line per diet which intercepts at zero dose. The bioavailability of the iron source relative to ferrous sulfate heptahydrate is then calculated as the ratio of the two slopes. The ratio is multiplied by 100 to provide the relative bioavailability value.

35

Procedure:- Rats are housed individually in polycarbonate cages, fitted with stainless steel grids. The animals are allowed free access to distilled water.

To render the rats anemic, the rats have *ad libitum* access to the control diet for 24 days. Fresh diet is supplied daily. Spoiling of diet by rats is reduced by covering the diet with a grid.

After 24 days, hemoglobin and weight is determined. Fifty rats with 5 hemoglobin levels between 4.5 and 5.8 mg/dl are randomized into 5 groups of 10 having approximately equal mean hemoglobin and body weight. Each group of animals is fed one of the experimental diets for 14 days. The rats are fed the diets *ad libitum* beginning with 20 g/day at day 0. The rats have free access to distilled water. Individual food consumption is measured daily. After 14 days, 10 the rats are weighed and hemoglobin is determined.

Results

Mean food consumption and iron intake is not affected by the type of iron 15 source. However the rats receiving no added iron ate less than those receiving iron. The rats consuming diets with 20 mg/kg of added iron consume slightly more than those receiving diets with 10 mg/kg iron.

Weight increase of the rats is not affected by the type of iron source. However, the rats receiving no added iron gained less weight than those 20 receiving iron. The rats receiving diets with 20 mg/kg iron gain slightly more weight than those receiving the diets with 10 mg/kg iron.

The blood hemoglobin levels at the start and at the end of the period are shown in the table below.

Mean hemoglobin values; (Standard Deviation)

Diet	Added Fe (mg/kg)	Initial hemoglobin (g/dl)	Final hemoglobin (g/dl)	Difference (g/dl)
Control	0	5.12 (0.42)	4.88 (0.43)	-0.24 (0.20)
A	10	5.12 (0.41)	8.66 (0.81)	3.54 (0.65)
B	20	5.12 (0.40)	11.53 (0.86)	6.41 (0.82)
1	10	5.13 (0.39)	7.77 (0.61)	2.65 (0.35)
2	20	5.13 (0.39)	10.89 (0.79)	5.76 (0.65)

The relative bioavailabilities are as follows:-

Diet	Relative Bioavailability
1, 2	87
A, B	100

The bioavailabilities of the Fe-protein complex is similar to that of ferrous sulfate and, from a practical viewpoint, has a very good bioavailability.

We Claim

1. An iron fortification system suitable for foods and beverages, the fortification system comprising a ferric-caseinate complex.
5
2. An iron fortification system according to claim 1 which is in powder form.
3. A foods or beverage which is fortified with iron, the foodstuff or beverage containing an fortification system comprising a ferric-caseinate complex.
10
4. A foods or beverage according to claim 3 which contains a fat.
5. A foods or beverage according to claim 3 which contains polyphenols.
- 15 6. A foods or beverage according to claim 5 which is a chocolate beverage base.
7. A foods or beverage according to claim 5 which is a liquid chocolate drink.
- 20 8. An iron fortification system suitable for foods and beverages, the fortification system comprising a ferric-caseinate complex which is produced by: dissolving a casein source in an aqueous liquid to provide a casein solution; adjusting the pH of the casein solution to about 5.4 to about 6.2; dissolving a ferric salt in an aqueous liquid to provide a ferric solution; adjusting the pH of the ferric solution to about 5.4 to about 6.2; combining the ferric solution with the casein solution and adjusting the pH to about 5.4 to about 7.0; and collecting ferric-caseinate complexes which form.
25
- 30 9. A retorted liquid beverage which contains lipid and a stable iron fortification system, the iron fortification system comprising a ferric-caseinate complex.
- 35 10. A beverage according to claim 9 which is a chocolate containing beverage.

11. A retorted liquid beverage which contains polyphenols and a stable iron fortification system, the iron fortification system comprising a ferric-caseinate complex.
- 5 12. A beverage according to claim 11 which is a tea beverage.
13. A beverage powder which contains lipid and a stable iron fortification system, the iron fortification system comprising a ferric-caseinate complex.
- 10 14. A beverage powder according to claim 13 which contains chocolate.
- 15 15. A process for the preparation of a ferric-caseinate complex, the process comprising:
 - dissolving a casein source in an aqueous liquid to provide a casein solution;
 - adjusting the pH of the casein solution to about 5.4 to about 6.2;
 - dissolving a ferric salt in an aqueous liquid to provide a ferric solution;
 - adjusting the pH of the ferric solution to about 5.4 to about 6.2;
 - combining the ferric solution with the casein solution and adjusting the pH to about 5.4 to about 7.0; and
 - 20 collecting ferric-caseinate complexes which form.
16. A process according to claim 15 in which the pH of the casein solution is adjusted to about 5.8 to about 6.0.
- 25 17. A process according to claim 15 in which the pH of the ferric solution is adjusted to about 5.4 to about 5.6.
18. A process according to claim 15 further comprising neutralizing the ferric-caseinate complexes to a pH in the range of about 6.0 to about 7.0.
- 30 19. A process according to claim 15 further comprising drying the ferric-caseinate complexes to powder.
- 35 20. A process according to claim 15 in which the pH of the combined ferric solution and casein solution is adjusted to about 5.8 to about 6.2.

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A23L1/304 A23L1/305

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE WPI Week 199018 Derwent Publications Ltd., London, GB; AN 1990-135712 XP002139317 & JP 02 083400 A (SNOW BRAND MILK PROD. CO. LTD.), 23 March 1990 (1990-03-23) cited in the application abstract</p> <p style="text-align: center;">-/-</p>	1,2,8, 15-20

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

2 June 2000

Date of mailing of the international search report

14/06/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentdaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl
Fax: (+31-70) 340-3016

Authorized officer

Alvarez Alvarez, C

INTERNAL SEARCH REPORT

Final Application No

PCT/EP 00/01737

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Week 199018 Derwent Publications Ltd., London, GB; AN 1990-135673 XP002139318 & JP 02 083333 A (SNOW BRAND MILK PROD. CO. LTD.), 23 March 1990 (1990-03-23) cited in the application abstract	1,2,8, 15-20
X	DATABASE WPI Week 199850 Derwent Publications Ltd., London, GB; AN 1998-587230 XP002139319 & JP 10 262570 A (SNOW BRAND MILK PROD. CO. LTD.), 6 October 1998 (1998-10-06) abstract	1,3,9
Y		4-7, 10-14
Y	DATABASE WPI Week 199727 Derwent Publications Ltd., London, GB; AN 1997-292424 XP002139320 & JP 09 107917 A (SNOW BRAND MILK PROD. CO. LTD.), 28 April 1997 (1997-04-28) abstract	4,5, 11-13
Y	US H1620 H (DOLAN ET AL.) 3 December 1996 (1996-12-03) claims 1,8	6,7,10, 14
X,P	DATABASE WPI Week 199922 Derwent Publications Ltd., London, GB; AN 1999-257566 XP002139321 & JP 11 075707 A (SNOW BRAND MILK PROD. CO. LTD.) abstract	1-4,13

INTERNATIONAL SEARCH REPORT

Information on patent family members

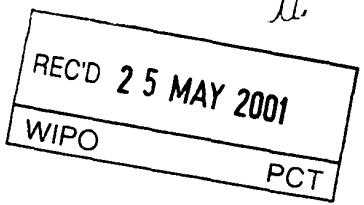
International Application No
PCT/EP 00/01737

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
JP 2083400	A	23-03-1990	NONE	
JP 2083333	A	23-03-1990	NONE	
JP 10262570	A	06-10-1998	NONE	
JP 9107917	A	28-04-1997	NONE	
US H1620	H	03-12-1996	NONE	
JP 11075707	A	23-03-1999	NONE	

We Claim

1. An iron fortification system suitable for foods and beverages, the fortification system comprising a ferric-caseinate complex.
- 5 2. An iron fortification system according to claim 1 which is in powder form.
3. A foods or beverage which is fortified with iron, the foodstuff or beverage containing an fortification system comprising a ferric-caseinate complex.
- 10 4. A foods or beverage according to claim 3 which contains a fat.
5. A foods or beverage according to claim 3 which contains polyphenols.
- 15 6. A foods or beverage according to claim 5 which is a chocolate beverage base.
7. A foods or beverage according to claim 5 which is a liquid chocolate drink.
- 20 8. An iron fortification system suitable for foods and beverages, the fortification system comprising a ferric-caseinate complex which is produced by: dissolving a casein source in an aqueous liquid to provide a casein solution; adjusting the pH of the casein solution to about 5.4 to about 6.2; dissolving a ferric salt in an aqueous liquid to provide a ferric solution; adjusting the pH of the ferric solution to about 5.4 to about 6.2; combining the ferric solution with the casein solution and adjusting the pH to about 5.4 to about 7.0; and collecting ferric-caseinate complexes which form.
- 25 9. A retorted liquid beverage which contains lipid and a stable iron fortification system, the iron fortification system comprising a ferric-caseinate complex.
- 30 10. A beverage according to claim 9 which is a chocolate containing beverage.
- 35

11. A retorted liquid beverage which contains polyphenols and a stable iron fortification system, the iron fortification system comprising a ferric-caseinate complex.
- 5 12. A beverage according to claim 11 which is a tea beverage.
13. A beverage powder which contains lipid and a stable iron fortification system, the iron fortification system comprising a ferric-caseinate complex.
- 10 14. A beverage powder according to claim 13 which contains chocolate.
- 15 15. A process for the preparation of a ferric-caseinate complex, the process comprising:
 - dissolving a casein source in an aqueous liquid to provide a casein solution;
 - 15 adjusting the pH of the casein solution to about 5.4 to about 6.2;
 - dissolving a ferric salt in an aqueous liquid to provide a ferric solution;
 - adjusting the pH of the ferric solution to about 5.4 to about 6.2;
 - combining the ferric solution with the casein solution and adjusting the pH to about 5.4 to about 7.0; and
 - 20 collecting ferric-caseinate complexes which form.
16. A process according to claim 15 in which the pH of the casein solution is adjusted to about 5.8 to about 6.0.
- 25 17. A process according to claim 15 in which the pH of the ferric solution is adjusted to about 5.4 to about 5.6.
18. A process according to claim 15 further comprising neutralizing the ferric-caseinate complexes to a pH in the range of about 6.0 to about 7.0.
- 30 19. A process according to claim 15 further comprising drying the ferric-caseinate complexes to powder.
- 35 20. A process according to claim 15 in which the pH of the combined ferric solution and casein solution is adjusted to about 5.8 to about 6.2.



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NO 6408/WO	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP00/01737	International filing date (day/month/year) 28/02/2000	Priority date (day/month/year) 01/03/1999
International Patent Classification (IPC) or national classification and IPC A23L1/304		
Applicant SOCIETE DES PRODUITS NESTLE S.A. et al.		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 2 sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input checked="" type="checkbox"/> Certain observations on the international application 		

Date of submission of the demand 19/09/2000	Date of completion of this report 22.05.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Rinaldi, F Telephone No. +49 89 2399 7360



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/01737

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-12 as originally filed

Claims, No.:

1-19 with telefax of 08/05/2001

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.:
- the drawings, sheets: ..

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/01737

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N) Yes: Claims 1-19
 No: Claims

Inventive step (IS) Yes: Claims 1-19
 No: Claims

Industrial applicability (IA) Yes: Claims 1-19
 No: Claims

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

R_It_m1

Basis of the report

The amendments fulfill the requirements of Art.34(2)(b) PCT.

Re Item V

**Reasoned statement under Art.35(2) with regard to novelty, inventive step or
industrial applicability; citations and explanations supporting such statement**

- 1 Reference is made to the following documents:
 - D1: DATABASE WPI Week 199018 Derwent Publications Ltd., London, GB; AN 1990-135712 XP002139317 & JP 02 083400 A (SNOW BRAND MILK PROD. CO. LTD.), 23 March 1990 (1990-03-23) cited in the application
 - D2: DATABASE WPI Week 199018 Derwent Publications Ltd., London, GB; AN 1990-135673 XP002139318 & JP 02 083333 A (SNOW BRAND MILK PROD. CO. LTD.), 23 March 1990 (1990-03-23) cited in the application
- 2 The subject-matter of independent product claims 1, 3, 8, 10 and 12, of independent process claim 14 and of thereof depending claims 2, 4-7, 9, 11, 13 and 15-19 is novel (Art.33(2) PCT). D1 and D2 disclose independently from each other a powdered iron-caseinate complex prepared from iron(II)sulfate (ferrous sulfate). However, none of the documents known in the art discloses an iron product comprising a ferric-caseinate complex obtainable from iron(III) salt (ferric salt) according to the process steps disclosed in claims 1 and 14.
- 3 The subject-matter of claims 1-19 fulfills the requirements of Art.33(3) PCT.
 - 3.1 The present application differs from D1 and D2 in that a process for the preparation of the ferric-caseinate complex from iron(III) salt and products obtainable by said process are claimed.
 - 3.2 The objective problem is to provide food and beverage compositions which are fortified with iron, and wherein the iron-complex does not cause off-flavour or discolouring, yet providing good bio-availability.
 - 3.3 The solution is provided by aid of a ferric-caseinate complex produced according to the process steps disclosed in present claims 1 and 14.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/01737

3.4 The prior art is silent about ferric-caseinate. Consequently, no production method thereof is available in the art. The positive effects of stability and availability are neither mentioned nor suggested in the prior art. The solution to the objective technical problem is non-obvious.

Re Item VIII

Certain observations on the international application

- 1 The following remarks referring to unclear subject-matter are made (Art.6 PCT).
 - 1.1 Lack of clarity of the claims as a whole arises, since the plurality of independent claims makes it difficult to determine the matter for which protection is sought.
 - 1.2 The expression "about" used throughout the description and especially throughout the claims (claims 8, 15-18 and 20) is vague (Guidelines Section IV III-4.5a).
 - 1.3 The present set of claims is not fully supported by the description.

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

LOCK, Graham
55, avenue Nestlé
CH-1800 Vevey
SUISSE

29 MAY 2001

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL PRELIMINARY
EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing (day/month/year)	22.05.2001
-------------------------------------	------------

Applicant's or agent's file reference NO 6408/WO	IMPORTANT NOTIFICATION	
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International application No. PCT/EP00/01737	International filing date (day/month/year) 28/02/2000	Priority date (day/month/year) 01/03/1999
---	--	--

Applicant SOCIETE DES PRODUITS NESTLE S.A. et al.
--

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/	Authorized officer
---------------------------------------	--------------------

European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Hutterer, G
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Tel. +49 89 2399-8066



PATENT COOPERATION TREATY
PCT
INTERNATIONAL PRELIMINARY EXAMINATION REPORT
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference NO 6408/WO	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP00/01737	International filing date (day/month/year) 28/02/2000	Priority date (day/month/year) 01/03/1999
International Patent Classification (IPC) or national classification and IPC A23L1/304		
Applicant SOCIETE DES PRODUITS NESTLE S.A. et al.		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 2 sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input checked="" type="checkbox"/> Certain observations on the international application 		

Date of submission of the demand 19/09/2000	Date of completion of this report 22.05.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Rinaldi, F Telephone No. +49 89 2399 7360



**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/01737

I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-12 as originally filed

Claims, No.:

1-19 with telefax of 08/05/2001

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

the description, pages:

the claims, Nos.:

the drawings, sheets:

5. This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/EP00/01737

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims 1-19
	No:	Claims
Inventive step (IS)	Yes:	Claims 1-19
	No:	Claims
Industrial applicability (IA)	Yes:	Claims 1-19
	No:	Claims

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/01737

R_I_t_m I

Basis of the report

The amendments fulfill the requirements of Art.34(2)(b) PCT.

Re Item V

Reasoned statement under Art.35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 1 Reference is made to the following documents:
 - D1: DATABASE WPI Week 199018 Derwent Publications Ltd., London, GB; AN 1990-135712 XP002139317 & JP 02 083400 A (SNOW BRAND MILK PROD. CO. LTD.), 23 March 1990 (1990-03-23) cited in the application
 - D2: DATABASE WPI Week 199018 Derwent Publications Ltd., London, GB; AN 1990-135673 XP002139318 & JP 02 083333 A (SNOW BRAND MILK PROD. CO. LTD.), 23 March 1990 (1990-03-23) cited in the application
- 2 The subject-matter of independent product claims 1, 3, 8, 10 and 12, of independent process claim 14 and of thereof depending claims 2, 4-7, 9, 11, 13 and 15-19 is novel (Art.33(2) PCT). D1 and D2 disclose independently from each other a powdered iron-caseinate complex prepared from iron(II)sulfate (ferrous sulfate). However, none of the documents known in the art discloses an iron product comprising a ferric-caseinate complex obtainable from iron(III) salt (ferric salt) according to the process steps disclosed in claims 1 and 14.
- 3 The subject-matter of claims 1-19 fulfills the requirements of Art.33(3) PCT.
 - 3.1 The present application differs from D1 and D2 in that a process for the preparation of the ferric-caseinate complex from iron(III) salt and products obtainable by said process are claimed.
 - 3.2 The objective problem is to provide food and beverage compositions which are fortified with iron, and wherein the iron-complex does not cause off-flavour or discolouring, yet providing good bio-availability.
 - 3.3 The solution is provided by aid of a ferric-caseinate complex produced according to the process steps disclosed in present claims 1 and 14.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/EP00/01737

3.4 The prior art is silent about ferric-caseinate. Consequently, no production method thereof is available in the art. The positive effects of stability and availability are neither mentioned nor suggested in the prior art. The solution to the objective technical problem is non-obvious.

Re Item VIII

Certain observations on the international application

- 1 The following remarks referring to unclear subject-matter are made (Art.6 PCT).
 - 1.1 Lack of clarity of the claims as a whole arises, since the plurality of independent claims makes it difficult to determine the matter for which protection is sought.
 - 1.2 The expression "about" used throughout the description and especially throughout the claims (claims 8, 15-18 and 20) is vague (Guidelines Section IV III-4.5a).
 - 1.3 The present set of claims is not fully supported by the description.

Applicant:
Our file:
PCT/EP 00/01737

Société Des Produits Nestlé S.A.
80299 WO (AS/SD)

Claims

1. An iron fortification system suitable for foods and beverages, the fortification system comprising a ferric-caseinate complex obtainable by:
 - 5 dissolving a casein source in an aqueous liquid to provide a casein solution;
 - adjusting the pH of the casein solution to about 5.4 to about 6.2;
 - 10 dissolving a ferric salt in an aqueous liquid to provide a ferric solution;
 - adjusting the pH of the ferric solution to about 5.4 to about 6.2;
 - 15 combining the ferric solution with the casein solution and adjusting the pH to about 5.4 to about 7.0;
 - and collecting ferric-caseinate complex.
2. The iron fortification system according to claim 1, which is in powder form.
- 15 3. A foods or beverage, containing an iron fortification system according to claim 1.
4. A foods or beverage according to claim 3 which contains a fat.
- 20 5. A foods or beverage according to claim 3 which contains polyphenols.
6. A foods or beverage according to claim 5 which is a chocolate beverage base.
- 25 7. A foods or beverage according to claim 5 which is a liquid chocolate drink.
8. A retorted liquid beverage which contains lipid and a stable iron fortification system according to claim 1.
- 29 9. A beverage according to claim 8, which is a chocolate containing beverage.
- 30 10. A retorted liquid beverage which contains polyphenols and a stable iron fortification

system according to claim 1.

11. The beverage according to claim 10 which is a tea beverage.

5 12. A beverage powder, which contains lipid and an iron fortification system according to
claim 1.

13. The beverage powder according to claim 12 which contains chocolate.

10 14. A process for the preparation of a ferric-caseinate complex, the process comprising:
dissolving a casein source in an aqueous liquid to provide a casein solution;
adjusting the pH of the casein solution to about 5.4 to about 6.2;
dissolving a ferric salt in an aqueous liquid to provide a ferric solution;
adjusting the pH of the ferric solution to about 5.4 to about 6.2;
15 combining the ferric solution with the casein solution and adjusting the pH to about 5.4 to
about 7.0;
and collecting ferric-caseinate complexes.

20 15. A process according to claim 14 in which the pH of the casein solution is adjusted to about
5.8 to about 6.0.

16. A process according to claim 14 in which the pH of the ferric solution is adjusted to about
5.4 to about 5.6.

25 17. A process according to claim 14 further comprising neutralizing the ferric-caseinate
complexes to a pH in the range of about 6.0 to about 7.0.

18. A process according to claim 14 further comprising drying the ferric-caseinate complexes
to powder.

30 19. A process according to claim 14 in which the pH of the combined ferric solution and casein
solution is adjusted to about 5.8 to about 6.2.

HNL 14.00-88

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

T :
LOCK, Graham
 55, avenue Nestlé
 CH-1800 Vevey
 SWITZERLAND

*Seen Orl
19/6/00*

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT
OR THE DECLARATION

(PCT Rule 44.1)

<p>Applicant's or agent's file reference NO 6408/WO</p>	Date of mailing <i>(day/month/year)</i> 14/06/2000 ✓
<p>International application No. PCT/EP 00/01737</p>	FOR FURTHER ACTION See paragraphs 1 and 4 below International filing date <i>(day/month/year)</i> 28/02/2000
<p>Applicant SOCIETE DES PRODUITS NESTLE S.A. et al.</p>	

1. The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
 34, chemin des Colombettes
 1211 Geneva 20, Switzerland
 Fascimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Further action(s): The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority  European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Chantal Meyer
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NOTE TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/ is filed, see below.

How? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continu)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Office, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

ENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference NO 6408/WO	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/EP 00/ 01737	International filing date (day/month/year) 28/02/2000	(Earliest) Priority Date (day/month/year) 01/03/1999
Applicant SOCIETE DES PRODUITS NESTLE S.A. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international search was carried out on the basis of the sequence listing :

contained in the international application in written form.

filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

furnished subsequently to this Authority in computer readable form.

the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. Certain claims were found unsearchable (See Box I).

3. Unity of Invention is lacking (see Box II).

4. With regard to the title,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

FERRIC FORTIFICATION FOR FOODS AND DRINKS

5. With regard to the abstract,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is Figure No.

as suggested by the applicant.

because the applicant failed to suggest a figure.

because this figure better characterizes the invention.

None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/01737

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A23L1/304 A23L1/305

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE WPI Week 199018 Derwent Publications Ltd., London, GB; AN 1990-135712 XP002139317 & JP 02 083400 A (SNOW BRAND MILK PROD. CO. LTD.), 23 March 1990 (1990-03-23) cited in the application abstract</p> <p>---</p> <p style="text-align: center;">-/--</p>	1,2,8, 15-20

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Date of the actual completion of the international search

2 June 2000

Date of mailing of the international search report

14/06/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Alvarez Alvarez, C

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 00/01737

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE WPI Week 199018 Derwent Publications Ltd., London, GB; AN 1990-135673 XP002139318 & JP 02 083333 A (SNOW BRAND MILK PROD. CO. LTD.), 23 March 1990 (1990-03-23) cited in the application abstract ---	1,2,8, 15-20
X	DATABASE WPI Week 199850 Derwent Publications Ltd., London, GB; AN 1998-587230 XP002139319 & JP 10 262570 A (SNOW BRAND MILK PROD. CO. LTD.), 6 October 1998 (1998-10-06) abstract	1,3,9
Y	---	4-7, 10-14
Y	DATABASE WPI Week 199727 Derwent Publications Ltd., London, GB; AN 1997-292424 XP002139320 & JP 09 107917 A (SNOW BRAND MILK PROD. CO. LTD.), 28 April 1997 (1997-04-28) abstract ---	4,5, 11-13
Y	US H1620 H (DOLAN ET AL.) 3 December 1996 (1996-12-03) claims 1,8 ---	6,7,10, 14
X,P	DATABASE WPI Week 199922 Derwent Publications Ltd., London, GB; AN 1999-257566 XP002139321 & JP 11 075707 A (SNOW BRAND MILK PROD. CO. LTD.) abstract -----	1-4,13

INTERNATIONAL SEARCH REPORT

Inf on patent family members

International Application No

PCT/EP 00/01737

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2083400 A	23-03-1990	NONE	
JP 2083333 A	23-03-1990	NONE	
JP 10262570 A	06-10-1998	NONE	
JP 9107917 A	28-04-1997	NONE	
US H1620 H	03-12-1996	NONE	
JP 11075707 A	23-03-1999	NONE	

XP-002139317

AN - 1990-135712 [18]

AP - JP19880234940 19880921

CPY - SNOW

DC - B04

DR - 1729-S

FS - CPI

IC - A61K37/16 ; C07K3/04 ; C07K15/24

MC - B04-B04A6 B05-A03A B12-H01

M1 - [01] A426 A960 C710 M423 M630 M720 M903 N104 N512 N513 P811 V752;
1327-U 0502-U

PA - (SNOW) SNOW BRAND MILK PROD CO LTD

PN - JP2083400 A 19900323 DW199018 000pp

PR - JP19880234940 19880921

XA - C1990-059679

XIC - A61K-037/16 ; C07K-003/04 ; C07K-015/24

AB - J02083400 To soluble casein aq. soln., ferrous salt aq. soln. is mixed
and reacted, then pptd. Fe casein is recovered.

- Pref. soluble casein is desalted casein, pref. Na-caseinate. Ferrous
salt is FeSO₄.

- USE/ADVANTAGE - Fe casein esp. useful for treatment of iron deficiency
anaemia, can be prep'd.

- In an example, As material, 60 kg of defatted milk was used.

(Compsn.: total solid 8.83%, fat 0.08%, protein 2.99%, lactose 4.44%,
ash 0.75%, Ca content 124 mg/100 g). This was hightly desalted by
electrophoretic appts. (Tokuyama Soda K.K., TS-24) until Ca content
reached at 10.9 mg/100g. During this time, pH was kept at 6.2 by
adding small amt. of NaOH. Thus, highly desalted defatted milk was
sterilised at 65 deg. C for 30 min., cooled at 50 deg. C, and conc. to
4.5 fold by batch ultrafiltrator (DDS Co., LAG-20, 0.36 m², GR61 PP
membrane), and desalted and conc. milk (13.3 kg) was obtd. This (12
kg) was cooled at 30 deg. C, then, Lactobacillus starter (frozen
BD-starter culture, 0.01%) was inoculated, rennet (30 ppm) was added,
and reacted for 30 min. This was divided into 2 equal parts, one was
lyophilised, another was spray dried. 1.2 kg of rennet milk protein
powder was obtd. The powder was dissolved at 20% concn. in H₂O, 18%
FeSO₄ aq. soln. was added, and formed curd was dehydrated by
centrifugation, and lyophilised to obtain Fe-casein. Fe content of
casein powder was 780 mg/100 g. No nasty taste or smell was
experienced. (4pp Dwg.No 0/0)

DRL - 0502-U 1327-U

IW - IRON CASEIN PREPARATION USEFUL TREAT ANAEMIA REACT FERROUS SALT
AQUEOUS SOLUTION SOLUBLE CASEIN AQUEOUS SOLUTION

IKW - IRON CASEIN PREPARATION USEFUL TREAT ANAEMIA REACT FERROUS SALT
AQUEOUS SOLUTION SOLUBLE CASEIN AQUEOUS SOLUTION

NC - 001

OPD - 1988-09-21

ORD - 1990-03-23

PAW - (SNOW) SNOW BRAND MILK PROD CO LTD

Tl - Iron casein prepn., useful in treatment of anaemia - by reacting
ferrous salt aq. soln. with soluble casein aq. soln.

XP-002139318

AN - 1990-135673 [18]

AP - JP19880234939 19880921

CPY - SNOW

DC - B04

DR - 1729-S

FS - CPI

IC - A61K37/16

MC - B04-B04A6 B05-A03A B12-H01

M1 - [01] A426 A960 C710 M423 M781 M903 P811 V752; 1327-U 0502-U

PA - (SNOW) SNOW BRAND MILK PROD CO LTD

PN - JP2083333 A 19900323 DW199018 000pp

PR - JP19880234939 19880921

XA - C1990-059640

XIC - A61K-037/16

AB - J02083333 A composition for therapy of iron deficiency contains iron casein, which consists of 85 wt%-95wt% of protein (calculated as casein), and 0.1-1 wt% of iron and 5012 wt% of water.

- A milk or process milk is desalts by electric dialysis for removal of calcium bound to casein, and formed into soluble casein powder with the addition of rennet. The powder is dissolved in water (10-25%) to obtain an aq. soln. to which an aq. soln. of 1% of FeSO₄ or iron gluconate is added to form a curd of iron casein, which is cleaned with ion exchange water, dehydrated and heat dried or freeze-dried to obtain the iron casein powder.

- USE/ADVANTAGE - For therapy of anaemia. (6pp Dwg.No.0/0)

AW - ANAEMIA

AKW - ANAEMIA

DRL - 0502-U 1327-U

IW - COMPOSITION THERAPEUTIC IRON DEFICIENT CONTAIN IRON CASEIN ACTIVE SUBSTANCE

IKW - COMPOSITION THERAPEUTIC IRON DEFICIENT CONTAIN IRON CASEIN ACTIVE SUBSTANCE

NC - 001

OPD - 1988-09-21

ORD - 1990-03-23

PAW - (SNOW) SNOW BRAND MILK PROD CO LTD

TI - Compositions for therapy of iron deficiency - contg. iron casein as active substance

XP-002139319

AN - 1998-587230 [50]

AP - JP19970087377 19970321

CPY - SNOW

DC - B04 D13

DR - 1278-U 1287-U 1391-U

FS - CPI

IC - A23J3/10 ; A23K1/16 ; A23L1/305 ; A61K38/16 ; C07K14/47 ; C07K103/00

MC - B04-N04 B05-A03A B05-B01G B05-C04 B05-C08 B12-M05 D03-G D03-H D03-H01G

M1 - [01] M423 M431 M782 M903 P714 Q220 Q233 V752

M2 - [02] A220 A940 C106 C108 C530 C730 C801 C802 C803 C805 C807 M411 M431

M782 M903 M904 M910 P714 Q220; R01278-M; 1278-U

- [03] A426 C810 M411 M431 M782 M903 M904 P714 Q220; R03036-M

- [04] A119 A940 C106 C108 C530 C730 C801 C802 C803 C805 C807 M411 M431
M782 M903 M904 M910 P714 Q220; R01391-M; 1391-U

- [05] A111 A940 C106 C108 C530 C730 C801 C802 C803 C805 C807 M411 M431
M782 M903 M904 M910 P714 Q220; R01287-M; 1287-U

PA - (SNOW) SNOW BRAND MILK PROD CO LTD

PN - JP10262570 A 19981006 DW199850 A23J3/10 007pp

PR - JP19970087377 19970321

XA - C1998-175806

XIC - A23J-003/10 ; A23K-001/16 ; A23L-001/305 ; A61K-038/16 ; C07K-014/47 ;
C07K-103/00

AB - J10262570 A carbonic acid and/or a hydrogencarbonic acid iron casein phosphopeptide complexes has the following properties: (1) containing 1-50 iron atoms to 1 mole of casein phosphopeptide; (2) dissolves at ratios of at least 5 wt. % in deionised water at 20 deg. C; (3) aqueous solution forms no precipitate at 90 deg. C for 10 minutes; and (4) has no characteristic astringent taste.

- USE - The complexes are useful for the preparation of foods and drinks, medicines and feeds.

- ADVANTAGE - The complex easily dissolves in water and exhibits heat resistance.

- (Dwg.0/2)

CN - R01278-M R01287-M R01391-M R03036-M

DRL - 1278-U 1287-U 1391-U

IW - IRON CASEIN COMPLEX USEFUL PREPARATION FOOD DRINK MEDICINE FEED

IKW - IRON CASEIN COMPLEX USEFUL PREPARATION FOOD DRINK MEDICINE FEED

NC - 001

OPD - 1997-03-21

ORD - 1998-10-06

PAW - (SNOW) SNOW BRAND MILK PROD CO LTD

TI - Iron casein phosphopeptide complexes - useful for preparation of food and drinks, medicines and feeds

XP-002139320

AN - 1997-292424 [27]

AP - JP19950268171 19951017

CPY - SNOW

DC - B05 D13 D21

DR - 0007-U 0035-U 0135-U 0172-U 0179-U 0183-U 0185-U 0190-U 0241-U 0252-U
0276-U 0279-U 0282-U 0419-U 0467-U 0503-U 0510-U 0543-U 0828-U 1278-U
1661-U 1678-U 1680-U 1759-U 1863-U

FS - CPI

IC - A23C9/152 ; A23L1/30 ; A23L1/304 ; A23L1/305 ; A61K31/35 ; A61K33/16 ;
A61K35/78 ; A61K38/16 ; A61K38/44

MC - B04-A10 B04-L03B B04-N06 B05-C07 B14-N06A D03-H01T2 D08-A05

M1 - [25] M423 M431 M782 M903 M904 P714 Q211 Q220 V600 V631 V752; R24040-M

- [26] M423 M431 M782 M903 M904 M910 P714 Q211 Q220 V723; R01863-M;
1863-U

- [31] M422 M423 M431 M782 M903 P714 Q211 Q220 V300 V400 V406 V752 V780
V793 V802 V811

M2 - [01] D011 D012 E720 J0 J011 J1 J171 J5 J521 L9 L921 M280 M314 M321
M332 M342 M372 M391 M412 M431 M511 M520 M530 M540 M782 M903 M904 M910
P714 Q211 Q220; 00945; R00172-M; 0172-U

- [02] A220 A940 C106 C108 C530 C730 C801 C802 C803 C805 C807 M411 M431
M782 M903 M904 M910 P714 Q211 Q220; R01278-M; 1278-U

- [03] A429 A940 C108 C316 C540 C730 C801 C802 C803 C804 C805 M411 M431
M782 M903 M904 P714 Q211 Q220; R12129-M; 1759-U

- [04] A429 A940 C108 C316 C540 C730 C801 C802 C803 C804 C805 M411 M431
M782 M903 M904 M910 P714 Q211 Q220; R01759-M; 1759-U

- [05] D012 D013 D940 G013 G100 H1 H100 H102 H121 H141 J0 J013 J1 J172
J3 J331 J5 J521 L9 L910 M280 M311 M313 M321 M332 M342 M343 M349 M373
M381 M391 M412 M431 M511 M520 M531 M540 M782 M903 M904 M910 P714 Q211
Q220; R00183-M; 0183-U

- [06] G037 G563 H4 H405 H464 H8 M280 M320 M415 M431 M510 M520 M530 M541
M782 M903 M904 M910 P714 Q211 Q220; R00543-M; 0543-U

- [07] A426 A960 C710 H4 H401 H481 H8 J0 J013 J1 J173 M280 M313 M321
M332 M344 M349 M381 M391 M411 M431 M510 M520 M530 M540 M620 M630 M782
M903 M904 P714 Q211 Q220; R16967-M; 0419-U

- [08] A426 A960 C710 H4 H401 H481 H8 J0 J013 J1 J173 M280 M313 M321
M332 M344 M349 M381 M391 M411 M431 M510 M520 M530 M540 M620 M630 M782
M903 M904 P714 Q211 Q220; R10523-M; 0419-U

- [09] F012 F013 F014 F015 F016 F123 H4 H405 H423 H484 H5 H521 H8 J4
J471 K0 L8 L814 L815 L822 L831 M280 M311 M315 M321 M332 M342 M344 M349
M373 M381 M391 M413 M431 M510 M521 M530 M540 M782 M903 M904 M910 P714
Q211 Q220; R00241-M; 0241-U

- [10] A212 A940 C108 C316 C540 C730 C801 C802 C803 C804 C805 M411 M431
M782 M903 M904 M910 P714 Q211 Q220; R01680-M; 1680-U

- [11] F013 F431 J0 J011 J1 J111 M280 M320 M413 M431 M510 M521 M530 M540
M782 M903 M904 M910 P714 Q211 Q220; R00190-M; 0190-U

- [12] H4 H402 H482 H8 J0 J012 J1 J171 J3 J371 M280 M312 M315 M321 M332
M333 M342 M343 M349 M381 M392 M416 M431 M620 M782 M903 M904 M910 P714
Q211 Q220; R00467-M; 0467-U

- [13] A119 A940 C017 C100 C730 C801 C803 C804 C805 C806 C807 M411 M431
M782 M903 M904 M910 P714 Q211 Q220; R01678-M; 1678-U

- [14] A111 A960 C710 H4 H401 H481 H8 J0 J013 J1 J173 M280 M313 M321

M332 M344 M349 M381 M391 M411 M431 M510 M520 M530 M540 M620 M630 M782
 M903 M904 P714 Q211 Q220; R04004-M; 0419-U

- [15] G036 G038 G562 H4 H401 H481 H7 H725 H8 M210 M211 M240 M283 M316
 M321 M333 M342 M373 M391 M415 M431 M510 M520 M530 M541 M782 M903 M904
 M910 P714 Q211 Q220 V0 V310; R00282-M; 0282-U
- [16] C108 C307 C510 C720 C800 C801 C802 C803 C804 C807 F012 F013 F014
 F015 F019 F541 F710 H1 H100 H121 H4 H401 H481 H8 K0 L7 L721 L943 M210
 M211 M240 M282 M311 M312 M321 M332 M342 M373 M392 M411 M431 M510 M522
 M530 M540 M640 M782 M903 M904 P714 Q211 Q220 V0 V321; R10031-M; 0185-U
- [17] A427 A940 A960 B615 B701 B713 B720 B815 B831 C106 C107 C520 C710
 C720 C801 C802 C803 C806 C807 D011 D013 D016 D019 D023 D030 D711 E350
 F012 F013 F014 F015 F113 H1 H121 H2 H201 H4 H402 H421 H481 H8 J0 J014
 J3 J373 K0 L8 L812 L821 L834 M210 M211 M240 M283 M311 M312 M313 M321
 M323 M331 M332 M342 M372 M373 M383 M391 M393 M411 M431 M512 M521 M530
 M540 M630 M782 M903 M904 M910 P714 Q211 Q220 V0 V324; 05475; R00279-M;
 0279-U
- [18] D011 D013 D023 E270 H1 H181 H2 H201 H4 H404 H484 H8 J5 J522 K0 L8
 L812 L821 L833 L834 L9 L910 M210 M211 M240 M282 M315 M321 M332 M344
 M383 M391 M412 M431 M511 M520 M530 M540 M782 M903 M904 M910 P714 Q211
 Q220 V0 V322; R00503-M; 0503-U
- [19] F012 F013 F014 F015 F432 H4 H402 H482 H8 J5 J521 M210 M211 M240
 M281 M311 M322 M342 M373 M392 M413 M431 M510 M521 M530 M540 M782 M903
 M904 M910 P714 Q211 Q220 V0 V323; R00252-M; 0252-U
- [20] F012 F013 F014 F015 F113 H4 H403 H421 H482 H8 J5 J522 K0 L8 L818
 L821 L832 L9 L942 L960 M280 M312 M321 M332 M343 M373 M391 M413 M431
 M510 M521 M530 M540 M782 M903 M904 M910 P714 Q211 Q220 V0 V330;
 R00035-M; 0035-U
- [21] G031 G036 G039 G060 G563 G640 H4 H401 H461 H7 H720 H721 H725 H8
 M1 M126 M134 M210 M211 M220 M223 M232 M240 M282 M311 M312 M321 M332
 M341 M344 M415 M431 M510 M520 M530 M542 M782 M903 M904 M910 P714 Q211
 Q220 V0 V340; 01391; R00007-M; 0007-U
- [22] G031 G036 G039 G060 G563 G640 H4 H401 H461 H7 H720 H725 H8 M1
 M126 M134 M210 M211 M220 M222 M232 M240 M282 M311 M312 M321 M332 M341
 M344 M415 M431 M510 M520 M530 M542 M782 M903 M904 M910 P714 Q211 Q220
 V0 V340; 01391; R00276-M; 0276-U
- [23] D012 D016 D025 D120 H4 H401 H441 H8 M210 M211 M225 M232 M240 M283
 M320 M412 M431 M511 M520 M530 M540 M782 M903 M904 M910 P714 Q211 Q220
 V0 V350; R00179-M; 0179-U
- [24] G024 G221 H7 H721 K0 L9 L951 M210 M211 M226 M232 M240 M282 M320
 M414 M431 M510 M520 M531 M540 M782 M903 M904 M910 P714 Q211 Q220 V0
 V360; R00510-M; 0510-U
- [27] H1 H100 H181 J0 J011 J1 J171 K0 L2 L250 M280 M314 M321 M332 M343
 M349 M381 M391 M416 M431 M620 M782 M903 M904 M910 P714 Q211 Q220;
 R01661-M; 1661-U
- [28] F012 F013 F014 F015 F016 F123 H4 H405 H423 H484 H5 H521 H8 J4
 J471 K0 L8 L814 L815 L822 L831 M280 M311 M315 M321 M332 M342 M344 M349
 M373 M381 M391 M413 M431 M510 M521 M530 M540 M782 M903 M904 M910 P714
 Q211 Q220; R00241-M; 0241-U
- [29] F012 F013 F014 F015 F016 F017 F019 F113 F123 H4 H405 H424 H483 H5
 H521 H8 K0 L8 L814 L818 L822 L831 M1 M126 M141 M280 M311 M323 M342
 M373 M393 M413 M431 M510 M522 M530 M540 M782 M903 M904 M910 P714 Q211
 Q220; R00135-M; 0135-U

- [30] H1 H100 H181 K0 K4 K431 M280 M312 M321 M332 M342 M383 M391 M416
M431 M620 M782 M903 M904 M910 P714 Q211 Q220; R00828-M; 0828-U

PA - (SNOW) SNOW BRAND MILK PROD CO LTD

PN - JP9107917 A 19970428 DW199727 A23L1/30 006pp

PR - JP19950268171 19951017

XA - C1997-094227

XIC - A23C-009/152 ; A23L-001/30 ; A23L-001/304 ; A23L-001/305 ; A61K-031/35
; A61K-033/16 ; A61K-035/78 ; A61K-038/16 ; A61K-038/44

AB - J09107917 Nutritious composition with low formation of dental caries
contains at least 2 of lactoferrin, lactoperoxidase, tea polyphenol
and fluorine.

- The composition preferably contains 0.05-0.1 wt.% lactoferrin,
0.0005-0.01 wt.% lactoperoxidase, 0.01-0.05 wt.% tea polyphenol and
0.01-0.5 wt.% fluorine.

- The composition contains proteins (e.g. casein, milk whey, or their
condensate), amino acid (e.g. taurine, or arginine), saccharides (e.g.
starch, sucrose or lactose), oil and fat (e.g. corn oil or palm oil),
and vitamin and mineral.

- USE - The composition e.g. baby milk powders, is used as baby food or
milk.

- In an example, skimmed milk powder (200 kg), milk whey protein
condensate (7.5kg), and lactose (44kg), and casein (0.6kg) were
dissolved in alkaline solution to which fat solution (30kg) containing
water-soluble vitamin (e.g. vitamin B1, B2, B6, B12, C, niacin, folic
acid, pantothenic acid, biotin, inositol, etc.), and mineral (e.g.
calcium carbonate, sodium iron (I) citrate, magnesium sulphate,
potassium chloride or copper sulphate, lactoferrin (100mg),
lactoperoxidase (10mg), and fat-soluble vitamin (e.g. vitamin A, D, E,
K, and beta-carotene) was added and formed into milk powder (100kg)
comprising 15.7% protein, fat (21.0%), saccharide (57.2%),
mineral (3.3%), water (2.8%), lactoferrin (0.1%), and
lactoperoxidase (0.01%). (Dwg.0/0)

CN - R00007-M R00035-M R00135-M R00172-M R00179-M R00183-M R00190-M

R00241-M R00252-M R00276-M R00279-M R00282-M R00467-M R00503-M

R00510-M R00543-M R00828-M R01278-M R01661-M R01678-M R01680-M

R01759-M R01863-M R04004-M R10031-M R10523-M R12129-M R16967-M R24040-M

DRL - 0007-U 0035-U 0135-U 0172-U 0179-U 0183-U 0185-U 0190-U 0241-U 0252-U

0276-U 0279-U 0282-U 0419-U 0467-U 0503-U 0510-U 0543-U 0828-U 1278-U

1661-U 1678-U 1680-U 1759-U 1863-U

IW - NUTRIENT COMPOSITION LOW FORMATION DENTAL CARIES CONTAIN LACTOFERRIN
LACTO PEROXIDASE TEA POLYPHENOL FLUORINE

IKW - NUTRIENT COMPOSITION LOW FORMATION DENTAL CARIES CONTAIN LACTOFERRIN
LACTO PEROXIDASE TEA POLYPHENOL FLUORINE

NC - 001

OPD - 1995-10-17

ORD - 1997-04-28

PAW - (SNOW) SNOW BRAND MILK PROD CO LTD

RRL - 00945 01391 05475

TI - Nutritious composition with low formation of dental caries - contains
lactoferrin, lacto-peroxidase, tea polyphenol and fluorine.

XP-002139321

AN - 1999-257566 [22]

AP - JP19970249756 19970829

CPY - SNOW

DC - B04 D13

FS - CPI

IC - A23J1/22 ; A23J3/10 ; A61K33/26 ; A61K38/17 ; B01J13/00

MC - B04-N02 B14-E11 D03-H01T2

M1 - [03] M423 M431 M782 M903 M904 P711 Q211 V600 V631 V752; R24040-M

M2 - [01] A426 A940 A960 C710 C730 M411 M417 M431 M782 M903 M904 P711 Q211;
R07107-K R07107-M R07107-T

- [02] A426 A940 A960 C710 C730 M411 M417 M431 M782 M903 M904 P711 Q211;
R06031-K R06031-M R06031-T

PA - (SNOW) SNOW BRAND MILK PROD CO LTD

PN - JP11075707 A 19990323 DW199922 A23J3/10 006pp

PR - JP19970249756 19970829

XA - C1999-075589

XIC - A23J-001/22 ; A23J-003/10 ; A61K-033/26 ; A61K-038/17 ; B01J-013/00

AB - J11075707 Dried and pulverised iron casein complex is new and
comprises 1 mole caseins, 1-1000 atoms of iron, and at least 1 mole
carbonic acid and/or a hydrogencarbonic acid, especially containing 20
wt.% water, and optionally dispersed or dissolved in an oil to give a
solution or an oil in water type emulsion.

- USE - The preparations are useful for iron enriching food and drinks.

- (Dwg.0/0)

CN - R06031-K R06031-M R06031-T R07107-K R07107-M R07107-T R24040-M

IW - NEW DRY PULVERISE IRON CASEIN COMPLEX USEFUL IRON ENRICH FOOD DRINK

IKW - NEW DRY PULVERISE IRON CASEIN COMPLEX USEFUL IRON ENRICH FOOD DRINK

NC - 001

OPD - 1997-08-29

ORD - 1999-03-23

PAW - (SNOW) SNOW BRAND MILK PROD CO LTD

TI - New dried and pulverised iron casein complex - useful for iron
enriching food and drinks